

## Topic 1

**Atomic number:** number of protons (or electrons in an element)

**Mass number:** number of protons plus neutrons

**Isotopes:** atoms of the same element that have different number of neutrons

**Relative atomic mass:** the average mass of an atom of an element relative to  $1/12^{\text{th}}$  of the mass of a  $^{12}\text{C}$  atom

**Relative isotopic mass:** the mass of an isotope relative to  $1/12^{\text{th}}$  of the mass of a  $^{12}\text{C}$  atom

**Orbital:** a region that can hold 2 electrons of opposite spins

**Ionisation Energy:** the energy required to remove one mole of electrons from one mole of gaseous atoms to form one mole of gaseous ions.

**m/z:** mass to charge ratio

## Topic 2

**Covalent bond:** electrostatic attraction that occurs due to the sharing of two electrons between two non-metal atoms

**Ionic bond:** electrostatic attraction that occurs due to the electron transfer from a metal to a non-metal forming positive and negative ions

**Metallic bond:** electrostatic attraction that occurs when a positive metal ion is surrounded by a sea of delocalised electrons

**Electronegativity:** a measure of how well an atom can attract electrons towards itself in a covalent bond

## Topic 3

**Oxidising agent:** electron acceptor

**Reducing agent:** electron donor

## Topic 4

**Disproportionation:** simultaneous oxidation and reduction of a species

## Topic 6

**Homologous series:** family of compounds with same general formula, same empirical formula, similar reactivity and shows a trend in physical properties.

**Hydrocarbon:** a molecule that contains carbon and hydrogen only

**Structural isomers:** two molecules with the same molecular formula but different structural formula

**Stereoisomers/geometric isomers:** two molecules with the same molecular formula but different spatial arrangement of atoms

**Nucleophile:** electron pair donor

**Electrophile:** electron pair acceptor

**Radical:** a species with an unpaired (or lone) electron

**Sigma bond:** overlap of two s-orbitals

**Pi bond:** overlap of two p-orbitals

**Homolytic fission:** splitting of a bond to form two radicals

**Heterolytic fission:** splitting of a bond to form two oppositely charged ions

**Reflux:** a continuous cycle of boiling and condensation

## Topic 8

**Enthalpy change ( $\Delta H$ ):** the heat energy change measured at constant pressure

**Bond enthalpy:** the energy required to break a covalent bond

**Mean bond enthalpy:** the average energy required to break 1 mole of a given covalent bond in a gas

**Enthalpy of combustion:** enthalpy change when one mole of a substance is completely burned in excess oxygen

**Enthalpy of formation:** enthalpy change when one mole of a compound is formed from its elements in their standard states under standard conditions

**Enthalpy of reaction:** enthalpy change when one mole of a substance is transformed by a chemical reaction under standard conditions

**Enthalpy of neutralisation:** enthalpy change when one mole of water is formed in an acid-base neutralization reaction

**Standard conditions:** 100 kPa and 298 K

## Topic 9

**Activation energy:** minimum energy required for a reaction to occur

## Topic 10

**Equilibrium:** the rate of the forwards and backwards reactions are equal

**Equilibrium:** the concentrations of reactants and products are constant

## Topic 12

**Bronsted-Lowry acid:** proton donor

**Bronsted-Lowry base:** proton acceptor

**Strong acid/base:** completely dissociates in water

**Weak acid/base:** incomplete dissociation in water

**Definition of pH...**use  $\text{pH} = -\log_{10} [\text{H}^+]$

**Definition of  $K_w$ ...**use  $K_w = [\text{H}^+][\text{OH}^-]$

**Buffer solution:** a solution that resists changes in pH when small amounts of acid or base are added

## Topic 13

**Enthalpy of atomisation:** enthalpy change when one mole of gaseous atoms is formed from an element in its standard state

**Electron affinity:** enthalpy change when one mole of gaseous ions is formed from one mole of gaseous atoms

**Lattice enthalpy:** enthalpy change when one mole of an ionic solid is formed from its gaseous ions

**Enthalpy of solution:** the enthalpy change that occurs when 1 mole of an ionic compound dissolves in water

**Enthalpy of hydration:** the enthalpy change that occurs when 1 mole of gaseous ions forms aqueous/hydrated ions.

**Entropy:** a measure of chaos or disorder

## Topic 14

**Standard conditions:** concentration  $1 \text{ mol dm}^{-3}$   $\text{H}^+$  ions, temperature = 298 K and pressure = 101 kPa (1 atm).

## Topic 15

**Transition metal:** a metal that can form one or more ions that have partially filled d orbitals

**Ligand:** a molecule that has at least one lone pair of electrons

**Complex ion:** a central metal ion surrounded by ligands

**Coordination number:** how many bonds are there to the metal ion

**Monodentate:** a ligand with only one lone pair of electrons

**Bidentate:** a ligand with only two lone pair of electrons

**Multi or polydentate:** a ligand with more than two lone pair of electrons

**Heterogenous catalyst:** a catalyst that is in a different state from the reactants

**Homogenous catalyst:** a catalyst that is in the same state as the reactants

**Auto catalysis:** a reaction that generates the catalyst

## Topic 16

**Quenching:** stopping the reaction by adding acid, base or cold water

**Order:** the factor by which each reactant affects the rate

**Overall order:** the sum of the individual orders

**Half-life:** the time it takes for the concentration to half

**Rate-determining step:** the slow step in a multi-step reaction

## Topic 17

**Condensation:** removal of a small molecule, usually the removal of water (or HCl)

**Hydrolysis:** the breaking of a bond, usually by adding water

**Chiral centre:** a carbon atom surrounded by 4 different groups

**Optical isomers/Enantiomers:** two non-superimposable mirror images

**Optical activity:** the amount by which an enantiomer rotates the plane of plane polarised light

**Racemic mixture:** a 50/50 mixture of two enantiomers

## Topic 18

**Isoelectric point:** the pH at which a zwitterion forms in solution

## Topic 19

**TLC:** thin layer chromatography

**HPLC:** High Performance Liquid Chromatography

**GC:** Gas Chromatography

**Retention time:** how long it takes for a compound to come off the column or to be detected

**NMR:** Nuclear Magnetic Resonance

**TMS:** tetramethylsilane

